

**TITLE**

**AROMA GENERATING APPARATUS AND METHOD IN A COOKING  
APPARATUS**

**CLAIM OF PRIORITY**

[0001] This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from my application *COOKING APPARATUS AND CONTROL METHOD THEREOF* filed with the Korean Industrial Property Office on 23 March 2000 and there duly assigned Serial No. 14883/2000.

**BACKGROUND OF THE INVENTION**

**Field of the Invention**

[0002] The present invention relates to an aroma generating apparatus and method in a cooking apparatuses and, more particularly, to a cooking apparatus having an aroma generating apparatus and method capable of generating aromas corresponding to food to be cooked.

**Description of the Related Art**

[0003] Cooking fumes and smells are produced from food cooked in a cooking chamber of a cooking apparatus such as a microwave oven, an electric rice cooker using an electricity as a cooking energy source, and a gas range and a gas oven using gas as a cooking energy source. Depending on a cooking operation, smoke and gas remain in the cooking chamber and are spread

1 around the cooking apparatus even after the cooked food is removed from the cooking apparatus.

2 **[0004]** Regarding a conventional cooking apparatus, Fig. 6 shows a microwave oven 101  
3 having a main body 103 formed with both a cooking chamber 105 and a component chamber 107  
4 and an external case 109 surrounding the main body 103 and defining an external appearance of  
5 the microwave oven 101. In front of cooking chamber 105 is mounted a door 111 opening and  
6 closing a front opening part of cooking chamber 105, and a control panel 113 having a keyboard  
7 115 is installed adjacent to door 111.

8 **[0005]** A tray 117 upon which food to be cooked rests is placed on a bottom of cooking  
9 chamber 105. In component chamber 107 are housed a high voltage transformer (HVT) 119  
10 generating a high voltage, a magnetron 123 generating electromagnetic waves by means of the  
11 high voltage generated by HVT 119, and a fan 121 drawing outdoor air into component chamber  
12 107. When a cooking menu and cooking conditions corresponding to the cooking menu are  
13 selected by a user through keyboard 115, controller activates magnetron 123 to generate the  
14 electromagnetic waves and supplies the generated electromagnetic waves to cooking chamber  
15 105, thereby cooking the food placed in cooking chamber 105.

16 **[0006]** This conventional microwave oven, however, is not provided with a function of  
17 supplying a food aroma corresponding to the cooking menu and removing the food aroma  
18 generated during cooking the food. Therefore, the user can not smell the food being cooked in  
19 the microwave oven before the food is cooked. Moreover, the user feels unpleasant when smoke  
20 and gas remain around the microwave oven after cooking operation.

21 **[0007]** In consideration of the tendency of many consumers preferring a cooking apparatus

1 having various and supplementary functions or being easy to use, a microwave oven is needed to  
2 be equipped with an aroma generating device for diffusing a variety of aromas corresponding to a  
3 selected food in order to stimulate the user's appetite while the user is waiting the food cooked.  
4 In addition, if the food aroma remained in and around the microwave oven after cooking  
5 operation can be removed, the air dispersed around and contained in the microwave oven can be  
6 maintained more pleasantly to the user. Furthermore, if an aroma good for a human beings  
7 health is generated while the microwave oven is in no operation, this would serve to improve our  
8 health.

### **SUMMARY OF THE INVENTION**

9  
10 [0008] It is an object of the present invention to provide a cooking apparatus having an aroma  
11 generating apparatus and method capable of generating aromas corresponding to foods to be  
12 cooked.

13 [0009] It is another object to provide a cooking apparatus and method able to diffuse aromas  
14 into a cooking chamber of the cooking apparatus after food is cooked and removed from the  
15 cooking apparatus.

16 [0010] It is yet another object to provide a cooking apparatus and method able to diffuse  
17 aromas for removing the smells of fumes generated when food is cooked in the cooking  
18 apparatus.

19 [0011] It is still another object to provide a cooking apparatus and method able to diffuse  
20 aromas outside the cooking apparatus.

1     **[0012]**   It is a further object to provide a cooking apparatus and method able to diffuse aromas  
2     corresponding to food to be cooked before the food is cooked.

3     **[0013]**   It is also an object to provide a cooking apparatus and method having various aroma  
4     substances mixed and diffused inside and outside the cooking apparatus.

5     **[0014]**   This and other objects of the present invention may be achieved by a microwave oven  
6     including a main body formed with a cooking chamber and a component chamber having a  
7     cooking driver to cook food placed within the cooking chamber, an aroma generator having an  
8     aroma diffuser diffusing either at least one food aroma corresponding to a cooking menu or a  
9     smell remover as a deodorizer removing fumes produced from the food during a cooking  
10    operation, a keyboard providing a selection of the cooking menu, and a controller controlling the  
11    aroma generator so as to produce the food aroma or the smell remover corresponding to the  
12    cooking menu selected by the keyboard.

13    **[0015]**   The aroma generator includes an aroma storage part storing the food aroma or the  
14    removing aroma therein or a plurality of aroma storage parts storing a plurality of aroma  
15    substances which are mixed to produce the food aroma or the smell remover corresponding to the  
16    selected cooking menu, a first valve installed at an outlet port of the aroma storage parts to  
17    control the amount of each aroma substances to be mixed, an aroma diffuser having at least one  
18    diffusing nozzle through which the food aroma or the smell remover is diffused outside or inside  
19    the microwave oven, diffusing nozzles diffusing the food aroma or the smell remover to anyone  
20    of either the outside of the main body and the inside of the cooking chamber, an outside diffusing  
21    hole through which the food aroma or the smell remover is diffused to the outside of the main

body, an inside diffusing hole formed at a sidewall of the cooking chamber to diffuse the food aroma or the smell remover into the cooking compartment.

[0016] The aroma diffuser includes a cylinder to which the diffusing nozzle is connected, an inlet port connected to the aroma storage part, a piston accommodated within the cylinder and reciprocating between a first diffusing position to diffuse the food aroma or the smell remover to the outside of the microwave oven and a second diffusing position to diffuse the food aroma or the smell remover into the cooking compartment, and a driving means for allowing the piston to reciprocate within the cylinder, a nozzle control valve to control the amount of the food aroma or the smell remover diffused from the cylinder is installed between the diffusing nozzle and the cylinder. The food aroma is diffused for a predetermined period of time after the cooking menu is selected while the smell remover to remove the food aroma is diffused after cooking of the cooking menu selected through the keyboard is finished.

[0017] According to another aspect of the present invention, these and other objects may also be achieved by a method of controlling a cooking apparatus including a main body formed with a cooking chamber and a component chamber having a cooker driver to cook a food within the cooking chamber, the method including the steps of preparing at least one food aroma corresponding to a cooking menu or at least one smell remover removing the fume, selecting the cooking menu, diffusing the food aroma or the smell remover corresponding to the cooking menu selected through the keyboard, producing the food aroma or the smell remover by mixing a plurality of aroma substances, and diffusing the food aroma for a predetermined period of time after the cooking menu is selected, the food aroma diffused increasingly by degree, and

1 intermittently after the cooking menu is selected, the food aroma diffused when the cooking  
2 menu is initially selected and when a cooking operation for the selected cooking menu is finished  
3 while the removing aroma is diffused after cooking.

#### 4 **BRIEF DESCRIPTION OF THE DRAWINGS**

5 [0018] A more complete appreciation of the invention, and many of the attendant advantages  
6 thereof, will be readily apparent as the same becomes better understood by reference to the  
7 following detailed description when considered in conjunction with the accompanying drawings  
8 in which like reference symbols indicate the same or similar components, and wherein:

9 [0019] Fig. 1 is a perspective view of a microwave oven according to the present invention;

10 [0020] Figs. 2 and 3 are enlarged sectional views showing operation states of an aroma  
11 diffuser of Fig. 1;

12 [0021] Fig. 4 is a block diagram of a control part according to the present invention;

13 [0022] Fig. 5 is a flow chart showing a method controlling a microwave oven according to the  
14 present invention; and

15 [0023] Fig. 6 is a perspective view of a conventional microwave oven.

#### 16 **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

17 [0024] Referring to Figs. 1 through 4, a microwave oven 1 according to the present invention  
18 include a main body 3 formed with a cooking compartment 5 and a component chamber 7, and  
19 an external case 9 enclosing main body 3 and defining an external appearance of microwave

oven 1. In front of cooking chamber 5 is mounted a door 11 opening and closing a front opening part of cooking chamber 5, and a control panel 13 having a keyboard 15 is provided adjacent to door 11 and in front of component chamber 7.

**[0025]** A tray 17 upon which food to be cooked is placed is provided on the bottom of cooking chamber 5. Component chamber 7 accommodates therein a high voltage transformer (HVT) 19 generating a high voltage with an external power, and a high voltage condenser (HVC) 21 storing the high voltage generated by the HVT 19, a magnetron 23 generating electromagnetic waves by means of the high voltage generated by the HVT 19, and a fan 24 drawing an external air into component chamber 7.

**[0026]** An aroma generator 30 produces a variety of food aromas to provide the smell of a cooked food and a variety of smell removers as deodorizers to remove or mask the smells of fumes produced from the food during a cooking operation, and a control part 60 activates magnetron 23 when a cooking menu is selected by operating keyboard 15 and controls aroma generator 30 so that food aroma corresponding to the selected cooking menu can be generated. Keyboard 15 has functions of selecting cooking menus and cooking conditions and generating a food aroma corresponding to the selected cooking menu.

**[0027]** As shown in Figs. 2 and 3, aroma generator 30 includes a plurality of aroma storage units 31 as aroma reservoirs for producing a plurality of food aromas and smell removers corresponding to the variety of foods to be cooked and for containing a plurality of aroma substances in a molecular state to produce each food aroma and smell remover. An aroma diffuser 40 coupled to aroma storage units 31 diffuses the food aromas and smell remover stored

1 and produced from aroma storage units 31. Depending upon any combination of aroma  
2 substances, food aromas and smell removers are produced from aroma storage units.

3 **[0028]** Each aroma storage unit 31 contains the respective aroma substance to produce the  
4 food aromas and the smell remover therein. At an outlet port for a passageway of each aroma  
5 substance is mounted first valves 57 for controlling an amount of the aroma substances to be  
6 mixed depending upon the selected cooking menu. Valves including a solenoid valve can be  
7 used as first valve 57. The solenoid valve is connected to and controlled by control part 60. A  
8 plurality of conduits are coupled between a second valve 55 and first valves 57.

9 **[0029]** The aroma diffuser 40 as a mixer mixing aroma substances includes an inlet port 47  
10 connected to the aroma storage units 31 through first valves 57, the conduits, and second valve  
11 55, a cylinder 41, a pair of diffusing nozzles 42 coupled to cylinder 41 and opposite to inlet port  
12 47 and diffusing a food aroma contained inside cylinder 41 through diffusing nozzles 42  
13 according to a selected cooking menu, and a driving means 51 coupled to a piston 49  
14 reciprocating within cylinder 41. Second valve 55 is connected between inlet port 47 and  
15 conduits and controls the amount of a food aroma and smell remover to remove the food aroma,  
16 both of which are produced by combination of the aroma substances and diffused from aroma  
17 storage units 31 into cylinder 41 through second valve 55 and first valves 57. Aroma substances  
18 released from aroma storage units 31 are mixed between diffusing nozzles 42 and aroma storage  
19 units 31 to produce the food aroma or the smell remover.

20 **[0030]** The diffusing nozzles 42 includes an outside diffusing nozzle 43 and an inside  
21 diffusing nozzle 45. Outside diffusing nozzle 43 diffuses the food aroma and the smell remover



1 according to the selected cooking menu toward the outside of main body 3, and the inside  
2 diffusing nozzle 45 diffuses the food aroma and the smell remover into the inside of the cooking  
3 chamber. Nozzle control valves 53 to control the amount of the food aroma and the smell  
4 remover are installed in the diffusing nozzles 43 and 45. A variety of valves including a solenoid  
5 valve can be employed as nozzle control valves 53.

6 **[0031]** A first diffusing hole 25 is formed on a planar surface of control panel 13 and  
7 connected to outside diffusing nozzle 43 for diffusing outside microwave oven 1 the food aroma  
8 and the smell remover diffused by outside diffusing nozzle 43. A plurality of second diffusing  
9 holes 27 formed on a sidewall of cooking chamber 5 for diffusing into cooking chamber 5 the  
10 food aroma and the smell remover diffused by inside diffusing nozzle 45.

11 **[0032]** Piston 49 accommodated in cylinder 41 reciprocates within the cylinder 41 by driving  
12 means 51 connected to control part 60 and between a first diffusing position A for connecting  
13 inlet port 47 to outside diffusing nozzle 43 and a second diffusing position B for connecting inlet  
14 port 47 to inside diffusing nozzle 45.

15 **[0033]** Referring to Fig. 5, a method for controlling a microwave oven according to the present  
16 invention will be described in more detail. A cooking menu is selected through keyboard 15  
17 provided on control panel 13 (S1). Control part 60 controls driving means 51, nozzle control  
18 valve 53, second valve 55, and first valves 57, and produces a food aroma according to the  
19 selected cooking menu by appropriately mixing the aroma substances stored in aroma storage  
20 unit 31 (S2). If the food aroma is supposed to be produced from the aroma substances, control  
21 part 60 activates driving means 51 to move piston 49 of aroma diffuser 40 to first diffusing

position A. As piston 49 is moved to first diffusing position A, inside diffusing nozzle 45 is closed, and outside diffusing nozzle 43 is communicated with inlet port 47 (S3). If inside diffusing nozzle 45 is closed by piston 49, the food aroma produced by mixing the aroma substances is diffused toward the outside of main body 3 through outside diffusing nozzle 43 for a predetermined period of time (S4).

[0034] Control part 60 can control outside diffusing nozzle 43 so as for the produced food aroma to be diffused increasingly or intermittently. Control part 60 can also control outside diffusing nozzle 43 so as for the food aroma to be diffused only when the cooking menu is initially selected or when cooking for the selected cooking menu is finished. While control part 60 activates outside diffusing nozzle 43 to release the food aroma outside, magnetron 23 is operated to cook the food placed in the cooking chamber (S5). While magnetron 23 is in operation, control part 60 drives the driving means 51 so as to allow the piston 49 of aroma diffuser 40 to move the second diffusing position B and closes outside diffusing nozzle 43 (S6). After the outside diffusing nozzle 43 is closed, and inside diffusing nozzle 45 is communicated with inlet port 47, control part 60 activates inside diffusing nozzle 45 to release the food aroma produced according to the selected cooking menu toward the food placed in cooking chamber 5 for a predetermined time (S7).

[0035] Depending on a selection of a cooking menu, the aroma is decided by control part 60, produced by aroma generator 30, and released through diffusing nozzle 42. For example, the food cooked in cooking chamber 5 is a fish, the aroma having a fish cooking smell will be released. The fish cooking smell varies by the selection of one of a kind of the fishes. If beef or

1 chicken is the selection of the cooking menu, beef cooking smell or chicken cooking smell will  
2 be released.

3 [0036] When it is determined that cooking is finished, control part 60 produces a deodorizer as  
4 bad smell remover to remove or mask the food aroma or non-agreeable smell corresponding to  
5 the selected cooking menu by combination of the aroma substances stored in the aroma storage  
6 units 31 (S8). The produced aroma for removal of the food aroma is diffused to the outside of  
7 main body 3 and into cooking chamber 5 through outside diffusing nozzle 43 and inside  
8 diffusing nozzle 45 by moving piston 49 to position A or position B (S9), respectively. Thus, the  
9 food aroma remaining inside the cooking chamber 5 and dispersed outside main body 3 is  
10 removed or masked.

11 [0037] The diffusing nozzles 43 and/or 45 can be rotatably mounted on aroma diffuser 40 to  
12 change diffusing directions of the food aroma and the smell remover. Food aroma diffusing  
13 nozzles to diffuse only the food aroma can be separately provided for outside diffusing nozzle  
14 and inside diffusing nozzle. Deodorant diffusing nozzles to diffuse only the smell remover to  
15 remove the food aroma can be separately provided for outside diffusing nozzle and inside  
16 diffusing nozzle.

17 [0038] An aroma to maintain the inside of a cooking chamber 5 fresh can be produced by  
18 mixing the aroma substances stored in the aroma storage unit 31 during non-cooking operation of  
19 microwave oven 1. Although an aroma to remove the food aroma is produced by mixture of the  
20 aroma substances and diffused, the food aroma can be removed by providing a deodorizing filter  
21 deodorizing the remaining food aroma and a fan blowing the food aroma toward the deodorizing

filter.

[0039] As described above, the aroma generator of the cooking apparatus according to the principle of the present invention is capable of generating a food aroma corresponding to a selected cooking menu and stimulating a user's appetite with the generated food aroma released before cooking. The food aroma remaining inside and outside the cooking chamber after completion of cooking can be removed or masked by the deodorizer or the smell remover.

[0040] Although the preferred embodiments of the present invention have been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.